Editorial

We are pleased to present the sixth Special Issue on Refinement, which contains mostly papers presented at the 15th BCS-FACS Refinement workshop, held at the University of Limerick, Ireland in June 2011, co-located with the FM conference.

This special issue sadly but appropriately starts with an obituary for one of the founders of the research area, Kaisa Sere, who passed away on December 5, 2012. At the 16th BCS-FACS Refinement workshop in Turku in 2013, three of her former Ph.D. students, Luigia Petre, Elena Troubitsyna, and Marina Waldén, gave a joint invited talk to commemorate Kaisa's many contributions to research in refinement. An overview of Kaisa's work is included in this obituary. She had been a program committee member for the Refinement workshop on several occasions, and she is a co-author on one of the papers included in this issue. We will miss her.

The five papers that follow are extensions of papers presented at the 15th Refinement workshop. "*Discovery of invariants through automated theory formation*" by Maria Teresa Llano, Andrew Ireland and Alison Pease explores how proof obligations in Event-B refinements can be supported by automatic detection of invariants using heuristics and proof-failure analysis.

Three more papers are concerned with refinement in Event-B. "*The behavioural semantics of Event-B refinement*" by Steve Schneider, Helen Treharne and Heike Wehrheim recasts Event-B refinement in terms of CSP refinement, thereby providing an explanation for the Event-B refinement proof obligations. "*Derivation of concurrent programs by stepwise scheduling of Event-B models*" by Pontus Boström, Fredrik Degerlund, Kaisa Sere and Marina Waldén introduces explicit flow control to concurrent Event-B specifications in a systematic and correctness-preserving way. "*Introducing extra operations in refinement*" by Eerke A. Boiten considers refinements which introduce actions on the concrete level which were not present at the abstract level, and in doing so reflects on design decisions taken for Event-B refinement.

"*Continuous KAOS, ASM, and formal control system design across the continuous/discrete modeling interface: a simple train stopping application*" by Richard Banach, Huibiao Zhu, Wen Su and Runlei Huang presents a case study in introducing control theory based reasoning and continuous behaviour as extensions of the Abstract State Machines method.

"*Refinement-based verification of implementations of Stateflow charts*" by Alvaro Miyazawa and Ana Cavalcanti considers refinement strategies that can be used to mechanically verify the implementations of Stateflow charts. This is important as Simulink's Stateflow is often used in industry for developing safety-critical systems.

Finally, "*Relational concurrent refinement part III: traces, partial relations and automata*" by John Derrick and Eerke Boiten continues the authors' modelling of concurrency semantics with associated refinement relations through relational abstract data types, covering in particular trace refinement in a different way and automata based theories. This paper is associated with the preceding Refinement workshop in Eindhoven. Other extended papers from that workshop appeared in another Special issue of this journal (24:1).

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